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Remarks and Instructions

The *Safety Procedures and Guidelines Manual* M 75-01 has been revised. The manual, revision packages, and individual chapters can be accessed at www.wsdot.wa.gov/publications/manuals/m75-01.htm.

For updating printed manuals, page numbers indicating portions of the manual that are to be removed and replaced are shown below.

Chapter	Remove Pages	Insert Pages
Title Page	i – ii	i – ii
Contents	iii – x	iii – xii
Chapter 10 Confined Space Entry	10-1 – 10-18	10-1 – 10-18

Please contact Kathy Dawley at 360-705-7808 or dawleyk@wsdot.wa.gov with comments, questions, or suggestions for improvement to the manual.

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Approved By

Signature

Washington State
Department of Transportation

Safety Procedures and Guidelines Manual

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Human Resources Division
Safety and Health Services Office

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Chapter 10 Confined Space Entry

10.1 Purpose

To provide guidance for the establishment of confined space entry programs for Washington State Department of Transportation (WSDOT) operations and facilities asxrequired by applicable regulations.

10.2 Scope and Applicability

This chapter has been developed for confined space entry using the referenced WAC chapters as guidance. All confined space entries shall comply with this document to ensure the safety of personnel entering confined spaces on all WSDOT work sites. Contractors or subcontractors entering confined spaces shall develop and implement their own confined space program.

10.3 References

- WAC 296-809 *Confined spaces*
  http://apps.leg.wa.gov/WAC/default.aspx?cite=296-809
- WAC 296-24-69507 *Confined spaces (welding)*
  http://apps.leg.wa.gov/WAC/default.aspx?cite=296-24-69507
- WAC 296-24-70007 *Work in confined spaces (welding)*
  http://apps.leg.wa.gov/WAC/default.aspx?cite=296-24-70007
- WAC 296-24-71501 thru 71507 *Health protection and ventilation (welding)*
  http://apps.leg.wa.gov/WAC/default.aspx?cite=296-24-71501, -71503, -71505, and -71507
- WAC 296-155-203, 280, 410, 655, and 657 *Construction confined space requirements*
  http://www.lni.wa.gov/wisha/rules/construction/HTML/296-155c.htm#WAC296-155-203, -280, -410, -655, and -657
- WAC 296-155-415 *Ventilation and protection in welding, cutting heating*
  http://apps.leg.wa.gov/WAC/default.aspx?cite=296-155-415
- WAC 296-155 Part N *Excavation, trenching and shoring*
  http://apps.leg.wa.gov/WAC/default.aspx?cite=296-155
- WAC 296-155 Part Q *Tunnels and shafts, caissons, cofferdams, and compressed air*
  http://apps.leg.wa.gov/WAC/default.aspx?cite=296-155

10.4 Definitions

Alternate Entry – Procedures that can be used for permit-required confined spaces when the only hazard is an atmospheric hazard and certain conditions are met.

Combustible Atmosphere – Any atmosphere which may explode or ignite if a source of ignition is present.

Confined Space – A space that is all of the following:

- Large enough and arranged so an employee could fully enter the space and work.
- Has limited or restricted entry or exit. Examples of spaces with limited or restricted entry are tanks, vessels, silos, storage bins, hoppers, vaults, excavations, and pits.
- Not primarily designed for human occupancy.

Contaminant – Any organic or inorganic substance, dust, fume, mist, vapor, or gas whose presence in the air may be harmful to human beings.

Entrant – An employee who is authorized by the employer to enter a permit-required confined space.

Entry Supervisor – The person (such as the supervisor, lead, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section.

Flammable Atmosphere – Any atmosphere in excess of 10 percent of the Lower Explosive Limit (LEL) and below the Upper Explosive Limit (UEL).

Hazardous Atmosphere – An atmosphere that may expose employees to the risk of death, incapacitation; and impairment of ability to self-rescue. That is, escape unaided from a permit-required confined space, injury, or acute illness caused by one or more of the following:

- Flammable gas, vapor, or mists in excess of 10 percent of its Lower Explosive Limit (LEL).
- Airborne combustible dust at a concentration that meets or exceeds its LEL. This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less.
- Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent.
- Atmospheric concentration of any substance which may exceed a permissible exposure limit. For additional information about atmospheric concentration, see Chapter 296-62 WAC Parts F, G, and I, *General occupational health standards*, and Chapter 296-841 WAC *Respiratory hazards*.

Hot Work – Any work involving burning, welding, riveting, cable socketing, or similar operation which can produce fire or toxic byproducts. Any work which produces a source of ignition.

Immediately Dangerous to Life and Health (IDLH) – Any of the following conditions:

- An immediate or delayed threat to life.
- Anything that would cause irreversible adverse health effects.
- Anything that would interfere with an individual's ability to escape unaided from a permit-required confined space.

Inerted Space – A space that has had an inert gas (argon, CO^2, etc.) introduced to reduce the oxygen content to 6 percent by volume or less.

Isolation – The process by which a permit-required confined space is removed from service and completely protected against the release of energy and material into the space by such means as:

- Blanking or blinding.
- Misaligning or removing sections of lines, pipes, or ducts.
- A double block and bleed system.
- Lockout or tagout of all sources of energy.
- Blocking or disconnecting.

Lower Explosive Limit (LEL)/Lower Flammable Limit (LFL) – The minimum vapor concentration of a combustible gas or vapor in air which will ignite if an ignition source is present. The term Minimum Explosive Concentration (MEC) is used for dusts.

Oxygen Deficient Atmosphere – An atmosphere which contains oxygen levels less than 19.5 percent by volume or which has a partial pressure of 135 millimeters of mercury or less. This may deviate at higher altitudes and should be determined for an individual location. Some of the more common causes of this problem are oxidation of metals (rust), bacterial action, combustion, and displacement by other gases.

Permissible Exposure Limits (PELs) – Refer to airborne concentrations of substances without regard to the use of respiratory protection and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect.

Permit-Required Confined Space (PRCS) – A confined space that has one or more of the following characteristics capable of causing death or serious physical harm:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material with the potential for engulfing someone who enters.
- Has an internal configuration that could allow someone entering to be trapped or asphyxiated by inwardly converging walls or by a floor, which slopes downward and tapers to a smaller cross section.
- Contains any physical hazard. This includes any recognized health or safety hazards including engulfment in solid or liquid material, electrical shock, or moving parts.

- Contains any other recognized serious safety or health hazard that could either:
  - Impair the ability to self-rescue, or
  - Result in a situation that presents an immediate danger to life or health.

Qualified Person – A confined space qualified person is an employee who has had confined space training and is familiar with:

- The recognition of hazards associated with entry into confined spaces.
- Procedures for use of entry permits.
- Atmospheric testing techniques and methods.
- Interpretation of atmospheric test results.
- Ventilation methods and equipment.
- Use of personal protective equipment.
- Safe work practices.
- Use of respirators.

Standby Attendant – A person stationed outside one or more permit-required confined spaces to monitor the entrant(s).

10.5 General Responsibilities

In addition to the responsibilities outlined, it is the responsibility of employees at all levels to ensure implementation of WSDOT's confined space entry procedure. It is also the responsibility of each employee to immediately report any unsafe act or condition to his or her supervisor.

10.5-1 Organizational Responsibilities

Are as assigned in Chapter 1 as well as the items below, specific to confined space entry.

10.5-2 Executive Management and Senior Management

- Ensure that site managers, supervisors, and other site personnel have the required experience to perform assessments and identify all confined spaces at sites under their control.
- Ensure that adequate funds are available, budgeted for the purchase of confined space equipment and related supplies.
- Perform periodic audits of employee training.

10.5-3 Mid-Level Management

- Retain confined space entry permits for a minimum of one year.
- Ensure implementation of this policy.

10.5-4 Supervisors

- Ensure that all confined space work is planned and implemented with safety as an integral part of the process.
- Participate in the development and implementation of Pre-Activity Safety Plans for the purpose of preventing injuries and accidents in confined spaces.
- Ensure that all employees involved are trained in confined space entry procedures and guidelines.
- Require active employee participation in each of the following involving confined space entry:
  - Pre-Activity Safety Plans.
  - Safety meetings.
  - Appropriate safety training.
  - Safety inspections of work activities, facilities, equipment, and vehicles.
  - Report any unsafe conditions to their supervisor immediately.
- Take immediate action when necessary to correct any reported hazards.
- Identify and monitor employee confined space entry training program needs.
- Monitor field and facility operations to ensure consistency with confined space entry procedures and guidelines.
- Use all appropriate personal protective equipment (PPE).
- Coach and mentor co-workers in confined space entry safety performance.
- Execute responsibility for the establishment and maintenance of a Confined Space Entry Program.

10.5-5 Entry Supervisor

- Ensure that **all** duties prescribed for entry supervisors under applicable regulations, training, and this policy are met.
- Ensure proper permits and safety procedures are followed closely at the jobsite.
- Ensure all safety precautions are taken and safety equipment needed for the operation is on site.
- Ensure only trained employees perform any of the tasks or activities associated with a confined space entry.
- Communicate appropriate needs to managers and/or supervisors.
- Know where confined and permit-required confined spaces are located at their worksite/facility.
- Ensure permit-required confined spaces are posted with warning signs.
- Ensure employees are provided with PPE as necessary for their job.
- Verifies and checks **all** of the following:
  - The appropriate entries have been made on the permit.
  - All tests specified by the permit have been conducted.
  - All procedures and equipment specified by the permit are in place before approving the permit and allowing entry to the space.

- Authorizes the entry into a permit-required confined space by ensuring entry condition have been met and signing the entry permit.
- Oversees entry operations.
- Knows about the hazards that may be faced during entry, including the mode, signs or symptoms, and consequences of the exposure.
- Terminates the entry and cancels the permit when:
  - The assigned task or job has been completed.
  - A condition in the space that isn't covered by the entry permit is discovered
- Verifies that rescue services are available and that there is a way to contact them.
- Removes unauthorized individuals who enter or attempt to enter the permit-required confined space during entry operations.
- Determines that entry operations remain consistent with the terms of the entry permit and acceptable entry conditions are maintained:
  - Whenever responsibility for a permit-required space entry operation is transferred.
  - At regular intervals dictated by the hazards and operations performed within the space.

10.5-6 Standby Attendant

- Ensure that **all** duties prescribed for Attendants under applicable regulations, training, and this policy are met.
- Understands the hazards that may be faced during entry, including the mode, signs or symptoms, and results of exposure to the hazards.
- Is aware of the behavioral effects of exposure to the hazard.
- Continuously maintains an accurate count of entrants in the space.
- Maintains an accurate record of who is in the permit-required confined space.
- Communicates with entrants as necessary to monitor their status or alert them of the need to evacuate the space.
- Monitors activities inside and outside the space to determine if it's safe for entrants to remain in the space.
- Orders entrants to evacuate the space immediately if **any** of the following conditions occur:
  - A prohibited condition.
  - The behavioral effects of hazardous exposure in an entrant.
  - A situation outside the space that could endanger entrants.
  - The attendant can't effectively and safely perform all required duties
- Takes the following actions when unauthorized persons approach or enter a space:
  - Warn unauthorized persons to stay away from the space.
  - Tells the unauthorized persons to exit immediately if they have entered the space.
  - Informs entrants and the entry supervisor if unauthorized persons have entered the space.

- Performs non-entry rescues as specified by rescue procedure.
- Has the means to respond to an emergency affecting one or more of the permit spaces being monitored without preventing performance of the attendants duties to the other spaces being monitored.
- Carries out no duties that might interfere with their primary duty to monitor and protect the entrants.
- Calls for rescue and other emergency services as soon as entrants may need assistance to escape from the space.
- Monitors entry operations until relieved by another attendant or all entrants are out of the space.
- Shall not enter confined space to perform rescue services.

10.5-7 Entrant

- Ensure that all duties prescribed for Entrants under applicable regulations, training, and this policy are met.
- Perform the assigned task.
- Review the permit before entry.
- Know the hazards they may face during entry, including the mode, signs or symptoms, and results of exposure to the hazards.
- Use equipment properly.
- Communicate with the attendant as necessary so the attendant can:
  - Monitor entrant status
  - Alert entrants of the need to evacuate
- Alert the attendant whenever either of these situations exist:
- A warning sign or symptom of exposure to a dangerous situation such as, behavioral changes, euphoria, giddiness potentially from lack of oxygen or exposure to solvents.
- A prohibited condition.
- Exit from the permit-required confined space as quickly as possible when one of the following occurs:
  - The attendant or entry supervisor gives an order to evacuate.
  - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
  - The entrant detects a prohibited condition.
  - An evacuation alarm is activated.

10.5-8 Safety Organization

Region Safety Office staff shall be responsible for the following confined space entry:

- Assist in developing or securing required training for all employees who have confined space responsibilities.
- Provide consulting services on regulatory interpretation and requirements of confined space classification or entry.

10.6 Policy

Each region will be responsible for protecting employees from the hazards of entry into confined spaces. These hazards include, but are not limited to, toxic, flammable, or oxygen deficient atmospheres and mechanical, electrical, chemical, or temperature hazards.

Concerned organizations will develop and enforce procedures which include planning, general precautions and work practices, evaluation of hazards, ventilation requirements, personal protection, isolation, training, recordkeeping, and responsibilities.

Procedures developed by each concerned organization will comply with WAC 296-809 and should address each project or location with a confined space in the organization. The identification of confined spaces and tasks and the hazards associated with them is required before procedures can be developed. The following are minimum requirements for confined space entry procedures:

- Personnel assigned to confined space work will be specifically trained for confined space entry.
- Ventilation must be provided for all alternate and permit-required confined spaces that have a known or potential atmospheric hazard, to ensure safe entry conditions prior to and during entry and work. Spaces that are specifically inerted to eliminate fire or explosion hazards do not require ventilation, though special procedures and respiratory protection are needed to safely conduct such work.
- A standby attendant must be present for all permit-required confined space entries and work.
- The confined space atmosphere and other potential hazards must be evaluated and appropriate protective procedures developed and equipment used.
- Rescue procedures must be established prior to entry into permit-required spaces. Rescue equipment and personnel will be available for confined space operations, as required.
- Prior to entry, the work crew will review the work to be done, potential hazards, and establish necessary safety and emergency procedures.
- The entry supervisor will complete and sign the entry-permit and, when required, hot work permit.

It is very important that the procedures developed are specific to the hazards and work common to the organization's confined spaces. The procedures that follow in Section 8, Procedures, are broad in scope and contain recommendations and requirements to maintain consistent confined space procedures throughout the department. There may be some recommendations that are not appropriate for all confined spaces.

For some WSDOT operations, a variance from WAC 296-809 requirements may be appropriate. Entry procedures for the protection of WSDOT personnel must be developed and implemented before a variance may be requested. Variance requests will be coordinated with and reviewed by the Region Safety Office.

If services are required for special circumstances to assist with the identification, procedural development or training of employees, these services shall be requested of the Region Safety Offices.

10.7 Confined Space Classifications

10.7-1 Permit-Required Confined Space

All confined spaces shall be considered permit-required confined spaces until designated otherwise by persons with an appropriate level of training and experience to make such a determination. Once an appropriate evaluation has been accomplished by a qualified person, and the space(s) meet conditions below, permit-required confined spaces may be reclassified as either an alternate entry confined space or a non-permit required space. The Confined Space Evaluation form in Appendix C may be used to assist with determination and classification.

To best ensure safety, all efforts shall be made to eliminate hazards before entry into a confined space creating non-permit required conditions. (Note that atmospheric hazards are generally considered to be controlled, but not eliminated, using forced air ventilation.

All hot work in confined spaces must be conducted using the permit entry procedures, including hot work permitting.

10.7-2 Alternate Entry Confined Space

Alternate entry procedures can be implemented instead of permit-entry procedures if the following conditions are met:

- The permit-required confined space is reclassified as an Alternate Entry Confined Space by a qualified person. The monitoring and inspection data justifying this reclassification shall be available at the work site.
- This documentation shall support that the only hazard in the confined space is an actual or potentially hazardous atmosphere.
- Continuous forced air ventilation is all that is required to maintain the atmosphere in a safe entry condition.

10.7-3 Non-Permit-Required Confined Space

Reclassify a confined space as a non-permit-required confined space:

- When a confined space is reclassified as a non-permit-required confined space, monitoring and inspection data shall be available at the work site to justify this action.
- This documentation shall support that the space does not contain any hazard that could cause serious physical harm or death to the entrant, including, but not necessarily limited to, atmospheric hazards, engulfment in a liquid or solid material, entrapment or any other serious safety or health hazard such as electrical shock or moving parts.

10.8 Procedures

10.8-1 Confined Space Identification

Survey all work locations, projects, and tasks within the organization to identify all confined spaces and the tasks and potential hazards associated with them.

Keep records for each confined space at your local facility and ensure that it is readily available to employees who must enter the confined space. These records will provide historical information on the hazards and procedures for the confined space. The records shall contain, as a minimum, the following:

Keep records for each confined space at your local facility and ensure that it is readily available to employees who must enter the confined space. These records will provide historical information on the hazards and procedures for the confined space. The records shall contain, as a minimum, the following:

- A copy or record of each entry permit issued for work in the confined space,
- Any incident or accident reports for work done in the confined space,
- Entry and work procedures developed for the confined space.
- An example of the entry and hot work permit can be found in Appendix 10-B of this document. The hot-work permit (form 750-061) can be found on the WSDOT intranet forms page.

When a permit-required confined space entry has been conducted, coordinate with the regional safety office to ensure reviews required under WAC 296-809-50006 are completed.

10.8-2 Training

For each project or job which requires entry into a confined space, specifically assign individuals for the entry who are competent in the evaluation of hazards, protective measures, first aid, and CPR.

All persons involved in confined space entry must posses the understanding, knowledge and skills necessary to safely perform assigned duties.

Employees with confined space responsibilities will be specifically trained for confined space entry (Course Code AZR). Training will include the following, as applicable to spaces entered and duties:

- Proper use and maintenance of personal protective equipment required for entry.
- Recognition and control/elimination of confined space hazards.
- Operation, maintenance, and calibration of atmospheric testing equipment.
- Powered ventilation equipment.
- Non-entry rescue procedures.
- Emergency and evacuation procedures.
- The communication systems to be used.
- Lockout/Tagout and isolation procedures.
- Assigned duties of entrants, attendants, and entry supervisors.
- Any other information required to safely perform confined space related work.

10.8-3 General Safety Requirements

Forced air ventilation will be maintained at all times in confined spaces that have an actual or potential hazardous atmosphere. If, for any reason, the ventilation fails or is otherwise interrupted, the confined space will be evacuated immediately. The ventilation provided will be of sufficient quantity to control the potential hazards of the confined space. If necessary, respiratory protection will be used in addition to ventilation and the space will be monitored regularly or continuously while occupied. Gas-powered ventilation will not be used unless it is positioned to prevent the exhaust gases from entering the confined space.

Note: When the space has been specifically inerted to eliminate the risk of fire or explosion, ventilation is not required. No personnel shall enter these spaces until the inert gas has been removed and the oxygen content has been restored to between 19.5 percent to 23.5 percent by volume.

A standby attendant will be positioned outside the permit-required confined space, appropriately equipped, and trained to obtain emergency assistance. This person will have the capability to communicate with workers in the space at all times. The standby attendant is not a rescuer. This person is responsible for communicating with and assisting confined space workers and obtaining emergency assistance.

The confined space will be evacuated immediately when any of the following conditions exist:

- The ventilation fails for any reason.
- The oxygen concentration falls below 19.5 percent or exceeds 23.5 percent.
- The concentration of combustible gas or vapor equals or exceeds 10 percent LEL.
- The concentration of any toxic contaminant, including combustible gas, exceeds the permissible exposure limit in WAC 296-809 or the exposure limit specified on the Material Safety Data Sheet (MSDS) and suitable respiratory protection is not being used.
- There are any indications of ill effects, such as:
  - Euphoria
  - Dizziness
  - Disorientation
  - Profuse sweating
  - Visual difficulties
  - Irritation, odors, or tastes
  - Change in heart rate
  - Change in breathing rate
  - Loss of coordination or dexterity
  - Weakness in the knees
  - Chest pains
  - Signs and symptoms identified on the MSDS

- There is a failure of any equipment or instrument required to protect the safety and health of employees. The space may be reentered after a complete reevaluation of the confined space, to ensure the safety and health of workers. Suitable protective equipment and monitoring of the confined space will be used as required.

Personal protective equipment suitable for the potential hazards will be used when entering a confined space. Although the equipment can vary from job to job, it may include:

- Respiratory protection equipment
- Chemical protective clothing
- Hand protection
- Eye and face protection
- Head protection
- Hearing protection
- Fall Protection

When employees may be required to wear respirators, all provisions of Chapter 8 Respiratory Protection Program will apply.

All tools, fire extinguishing, and other emergency equipment, as needed, will be present at the work site prior to entry into the confined space.

Where fall hazards are present, employees must follow provisions of the Fall Protection Program (and applicable regulations, In addition, appropriate controls shall be implemented to protect entrants from objects falling in the space.

Anyone noting a malfunction of any gas detector, sampling device, ventilation equipment, or any other device required for safe work shall notify fellow employees and evacuate the confined space immediately. Replacement or repaired equipment will be obtained prior to entry or reentry. Persons noting the malfunction should personally report the malfunction to the entry supervisor.

Equipment used for safe entry into confined spaces shall be maintained in accordance with manufacturer specifications, including air monitoring, rescue, emergency communication and other essential equipment,

If a hazardous atmosphere exists or can develop, workers will wear a safety harness with lifeline attached to a means of non-entry rescue equipment (tri-pods, booms, etc.). No employee will enter an IDLH atmosphere.

Compressed gas cylinders (except breathing air) shall not be allowed in any confined space. Compressed gas lines will be protected from rupture or damage.

Electrical circuits and mechanical hazards which may present a hazard in the confined area will be disconnected, locked out, and tagged in accordance with WAC 296-155-429 or WAC 296-803, as appropriate. Water standing in any confined area near electrical outlets or transformers will require that electrical outlets or transformers be disconnected and locked out before entry into such areas.

10.8-4 Rescue Procedures

Prior to entry into a permit-required confined space, an action plan must be prepared which provides a means for rescue of persons from the space in the event of an emergency. An emergency includes heart attacks and injuries that would require assistance for safely removing the person from the space. Each situation requires specific instructions and may vary from space to space.

WSDOT does not employ trained entry rescue personnel. Non-entry retrieval systems are the preferred method of rescue and will be used whenever feasible. Employees providing non-entry rescue service will undergo practice sessions at least every twelve months, in representative conditions of permit-required confined spaces.

When non-entry rescue is not feasible, a third part rescue service will be used as the entry rescue team. Note that many local fire departments may not be trained or equipped to perform confined space rescue, which is why emergency arrangements must be prearranged. Each individual emergency rescue plan shall be coordinated with the designated rescue organization, prior to confined space entry, to ensure the availability and appropriateness of their services. A plan to call 911 in the event of an emergency is not acceptable unless rescue has been coordinated with the public rescue service ahead of time.

Consideration must be given to how the standby attendant will obtain emergency assistance. An additional means of communication such as emergency radios, loud speaker systems, bells or alarms, portable or fixed air horns, etc., may be required.

10.8-5 Pre-Entry Procedures and Planning

An Entry Supervisor will evaluate the confined space. A Confined Space Entry (DOT Form 750-094) will be issued, as necessary, after the evaluation and planning are completed. See Appendix 10-B for sample forms.

A planning session by an entry supervisor and the work crew will address the following items:

- Time and date of entry.
- Work to be performed and procedures to use.
- Materials to be used.
- The hazards of the work and materials.
- The known hazards of the confined space.
- Emergency and safety procedures.
- Training required for safe work.

Evaluation of confined space atmospheres:

- The confined space atmosphere will be tested for oxygen deficiency, flammability and toxicity immediately before entry into the space is allowed. The monitoring equipment shall be calibrated in accordance with manufacturer's instructions. The entry crew should assist in or observe this evaluation. The evaluation will consider possible sources of contamination from the surrounding environment, the work to be performed, and the confined space itself. The following method will be used:
  - Test the atmosphere of the confined space with direct reading instruments and, if necessary, use colorimetric tubes for potential hazards. The testing procedure outlined in the following section should be used.
- When testing the confined space atmosphere, the following procedure should be used:
  - Smoking is prohibited in or near the entrance of a confined space. Care must be taken to eliminate any possibility of a spark or ignition source until the space has been tested and is determined to be free of combustible gas.
  - The initial test should be conducted by inserting a probe into the confined space atmosphere through a vent hole or some other opening, where available. The purpose of the initial test is to determine if a hazardous atmosphere has accumulated in the vicinity of the entrance. Where no openings exist, the entrance cover should be opened on the downwind side just enough to allow insertion of the sampling device.
  - If the initial test indicates no flammable atmosphere (and has acceptable oxygen concentrations), remove the cover, and from outside the space, conduct tests for oxygen content, combustible gases, and toxic contaminants.
  - Ventilate the confined space prior to entering to complete the evaluation. The entire area to be entered shall be tested to evaluate the accumulation of contaminants that are lighter or heavier than air. Testing should start at the entrance and continue into and around the confined space until all areas, top to bottom, of the space have been evaluated.
- The Confined Space Entry Permit shall be completed by the entry supervisor. The Hot Work Permit (if required) should be completed by work crew lead person and/or entry supervisor. A permit is an authorization in writing, specifying the location and type of work to be done. It certifies that confined space hazards have been evaluated by the entry supervisor and that necessary protective measures have been taken to ensure the safety of each worker.
- After the space has been determined to be safe for entry, the entry supervisor will review the information on the permits for accuracy and completeness and assign the expiration time for the permit. The entry supervisor will then review the potential hazards, required equipment, and work practices and procedures to be followed with the entering crew and sign the permit, authorizing entry.
- The entry permit shall be available at the work site outside the confined space. It shall be dated and carry an expiration time that is valid for a maximum of one shift only. A permit with the same requirements is required for each shift. A sample entry permit is included in Appendix 10-B.

10.8-6 Permit-Space Entry Procedures

Entry is not permitted without a properly completed entry permit. Reentry after a lunch break may require reevaluation of the atmosphere, depending on the nature of the hazards.

Forced air ventilation will be provided and be of sufficient quantity to control any potential atmospheric hazards. The ventilation air intake shall be positioned to prevent toxic or flammable contaminants from entering the confined space atmosphere. If the hazards cannot be controlled by this ventilation, the space shall be reevaluated to determine the source of the contamination. The source shall be secured to prevent the reintroduction of the contaminants into the space using WAC 296-803 Lockout/Tagout (Control of Hazardous Energy) for guidance.

No WSDOT employee will enter an IDLH atmosphere.

When tests for oxygen deficiency, flammability, or toxicity indicate that one or more atmospheric hazards may exist in the confined space, the space will be ventilated to obtain a safe atmosphere before entry. The presence of a safe atmosphere will be verified by testing. Continuous monitoring of the atmosphere may be necessary during the work operations to ensure the safety of the crew when a potentially hazardous atmosphere is present or could develop.

Provide entrants, or their authorized representatives, with an opportunity to observe the pre-entry and periodic testing.

Whenever a confined space is occupied, a standby attendant will be positioned outside the space, appropriately equipped and trained, to obtain emergency assistance. This person will have the capability to communicate with workers in the space at all times.

Entry into confined spaces where evaluation of the atmosphere indicates a hazard exists or could develop is prohibited until the entry supervisor has identified appropriate emergency and protective equipment and procedures and issued an entry permit.

The entry supervisor will take positive steps to prevent accidental introduction of hazards through interconnecting equipment such as piping, ducts, vents, drains, or other means. This may require:

- Isolating the tank or confined space from all potential sources of hazards by one of the following:
  - Remove a valve, spool piece, or expansion joint and cap the open ends. Tag the lines.
  - Insert a blank in the line and tag it.
- Safety Lockout/Tagout – If mechanical or electrical hazards exist that will pose a potential hazard to the employee entering the confined space, the mechanical or electrical hazard will be secured, locked out, and tagged prior to the entry.
- Secure or relieve components which are hazardous due to gravitational or stored energy forces.
- Position ventilation intakes to prevent the entry of contaminated air.

Appropriate protective equipment will be used by all employees entering confined spaces.

10.8-7 Alternate Entry Procedures

If the space has met all the conditions specified in Section 7.2, alternate entry procedures can be used instead of permit entry procedures. At a minimum, alternate entry procedures must include the following elements:

- Eliminate any unsafe conditions before removing an entrance cover.
- Guard the opening with a railing, temporary cover, or other temporary barrier to prevent accidental falls through the opening and protect entrants from objects falling into the space.
- Certify that pre-entry measures have been taken (such as safe removal of the cover and having protection needed to gather pre-entry data), with the date, location of the space, and signature of the person certifying.
- Make the pre-entry certification available before entry to each entrant.
- Test the internal atmosphere with a calibrated, direct-reading instrument for all of the following, in this order, before an employee enters the confined space:
  - Oxygen content
  - Flammable gases and vapors
  - Potential toxic air contaminants
- Provide entrants, or their authorized representatives, with an opportunity to observe the pre-entry and periodic testing.
- Make sure the atmosphere within the space isn't hazardous when entrants are present.
- Use continuous forced air ventilation, as follows:
  - Wait until the forced air ventilation has removed any hazardous atmosphere before allowing entrants into the space.
  - Direct forced air ventilation toward the immediate areas where employees are, or will be, and continue ventilation until all employees have left the space.
  - Provide the air supply from a clean source and make sure it doesn't increase hazards in the space.
- Test the atmosphere within the space as needed to make sure hazards don't accumulate.
- If a hazardous atmosphere is detected during entry, do all of the following:
  - Evacuate employees from the space immediately.
  - Evaluate the space to determine how the hazardous atmosphere developed.
  - Implement measures to protect employees from the hazardous atmosphere before continuing the entry operation.
  - Verify the space is safe for entry before continuing the entry operation.

10.8.8 Coordination with WSDOT Contractors

Contractors performing work within agency-owned permit required confined spaces (PRCS) are required to follow the confined space requirements in WAC 296-809. WSDOT must inform a contractor with work in an agency-owned PRCS of the following:

- Confined spaces may only be entered if they meet the requirements of WAC 296-809.
- Any known hazards associated with agency-owned PRCSs. This should be based on any previous WSDOT experience entering the PRCS.
- Specific precautions and procedures that WSDOT requires for the protection of employees that work in or near the identified PRCS.

In addition to the above, WSDOT personnel must coordinate entry operations with the prime and any sub-contractors when working in or near identified PRCS. This coordination must include:

- Review of the contractor's confined space plan and any hazards that are associated with the contractor's work, and discussion of entry procedures prior to commencement of work activities.

10.9 Hot Work

Hot work in confined spaces shall comply with WAC 296-155-400 and/or WAC 296-24-680 to 722, as applicable. A Hot Work Permit (Form 750-061) is required for any hot work conducted in a confined space.

In addition to the confined space entry safeguards, hot work shall not be started inside a confined space or on its exterior surface until tests for flammability have been made and a hot work permit has been issued.

Provisions shall be made to maintain conditions below 10 percent of the lower explosive limit and to prevent accumulation of toxic contaminants.

Fire extinguishing equipment will be readily available to employees involved in confined space hot work. Class A (water extinguishers) shall be used for confined space hot work. ABC or CO^2 fire extinguishers shall be used in a confined space only by persons wearing self-contained breathing apparatus.

Hot work in confined spaces shall only be conducted on clean, bare metal. All coating oils, cleaning/degreasing compounds, solvents, salts, and any other substance that may create a toxic by product must be removed prior to conducting hot work.

Local or general dilution ventilation to reduce contaminants to the lowest feasible levels is required for hot work in confined spaces.

Respiratory protection is required if ventilation can not reduce contaminants to below permissible exposure limits.

Gas cylinders and welding machines must not be brought into the confined space at any time.

10.10 Management Controls

The confined space entry program developed by concerned organizations must contain provisions for evaluating its effectiveness. This evaluation should include the following:

- Periodic audits of employee training.
- Review of entry procedures to ensure the proper permits, procedures, and equipment are used for each confined space entry.

10.11 Appendices